# INDEX TO VOLUME 20


A

Page

Absolute electrometer, compared with a transformer method, RP1079 317
Absolute electrometer for measuring high alternating voltages, RP1078 253
Absorption, hydrocarbons in near infrared, RP1072 129
Acceleration measurements in vibration, RP1101 707
Acetic acid, extraction of lubricating oil with, RP1067 83
Aerology, application of radio meteorograph {RP1082 369 / RP1102 723
Air analysis by radio meteorograph {RP1082 369 / RP1102
Aircraft dopes, use of plastics, RP1098 651
Agitation of water, effect on its supercooling and freezing, RP1105 799
Alcohol with gasoline, water tolerance {RP1059 1 / RP1060 9
*Aldrich, Elizabeth W.*, Critical solution temperatures of mixtures of gasoline, *n*-propyl alcohol, and water, RP1060 9
—, *Oscar C. Bridgeman and*, Water tolerances of mixtures of gasoline with ethyl alcohol, RP1059 1
Alloys, dental gold, analysis, RP1103 745
Alloys, heat-resisting, properties, RP1106 809
Alloys, iron-carbon, effect of carbon on critical cooling rate, RP1092 571
Alpha-, beta-, and gamma-cellulose, volumetric determination in pulps and papers, RP1068 87
Altitude measurements with radio meteorograph, RP1082 369
Amplitude measurements, RP1101 707
Anhydrite, heats of hydration and transition, RP1107 825
Arc spectra of iron, titanium, and carbon, RP1062 33
Argon spectrum, RP1061 17
Asphalts, weathering tests on, RP1073 159
Attracted-disk electrometer for measuring high alternating voltages, RP1078 253
Austenitic grain size of iron-carbon alloys and carbon steels, RP1092 571

B

Back-siphonage in plumbing systems, RP1086 479
Base-metal thermocouples, reference tables, RP1080 337
Benzene, boiling point and vapor pressure, RP1097 641
Beta-, alpha-, and gamma-cellulose, volumetric determination in pulps and papers, RP1068 87
Boiling point, benzene, ethylene chloride, *n*-heptane, 2,2,4-trimethylpentane, RP1097 641
Boron, determination in phosphate rock, RP1095 607
Boron, lead silicate glazes, RP1064 57
*Brenner, Abner*, Magnetic method for measuring the thickness of nonmagnetic coatings on iron and steel, RP1081 357
Brick, sand-lime, properties, RP1065 67
*Brickwedde, Ferdinand G., Irwin G. Priest and*, Minimum perceptible colorimetric purity as a function of dominant wave length, RP1099 673
—, *Russell B. Scott, Francis B. Silsbee and*, Some experiments at radio frequencies on superconductors, RP1070 109
*Brickwedde, Langhorne H., and George W. Vinal*, Electromotive force of saturated Weston standard cells containing deuterium oxide, RP1094 599
*Bridgeman, Oscar C., and Elizabeth W. Aldrich*, Water tolerances of mixtures of gasoline with ethyl alcohol, RP1059 1
Bromine, effect on wool, RP1089 555
*Brooks, Herbert B., Francis M. Defandorf, and Francis B. Silsbee*, An absolute electrometer for the measurement of high alternating voltages, RP1078 253
*Brown, Clement R.*, Fire tests of treated and untreated wood partitions, RP1076 217
*Bunting, E. N., A. S. Creamer, R. F. Geller and*, Some "soft" glazes of low thermal expansion, RP1064 57

C

Cadmium coatings, thickness measurements, RP1081 357
Calcium sulfate, heats of hydration and transition, RP1107 825
Calorimeter for heat of solution in acids, RP1107 825
Carbon, effect on cooling rate of iron-carbon alloys and carbon steels, RP1092 571
Carbon spectrum, RP1062 33
Cathode-ray oscillograph for measurement of vibration, RP1101 707
Cells, standard, containing deuterium oxide, electromotive force, RP1094 599
Cellulose, alpha-, beta-, and gamma-, volumetric determination in pulps and papers, RP1068 87
Cement clinker, glass content, RP1066 77
Cement clinker, minor constituents, RP1074 173
Chlorine, effect on wool, RP1089 555
Chromaticity sensibility, RP1099 673
Clinker, portland cement, glass content, RP1066 77
*Coblentz, W. W., R. Stair and*, Radiometric measurements of ultraviolet solar intensities in the stratosphere, RP1075 185
Colorimetry, tolerances, RP1099 673
Comparison of transformer method with absolute electrometer, RP1079 317
Compressometer method for evaluating crease-resistant finishes, RP1077 241
Concrete, measurement of vibration, RP1101 707
Consistence of vitreous enamel frits, RP1063 39
Constantan thermocouples, reference tables, RP1080 337
Constitution of portland cement clinker, RP1074 173
Constituents in portland cement clinker, RP1074 173
*Cooke, George J., Raymond A. Heindl and*, Fireclay ladle sleeves RP1084 411
Copper coatings, thickness measurements, RP1081 357
Copper-constantan thermocouples, reference tables, RP1080 337
Copper, determination by ignition of copper sulfide, RP1103 745
Copper salts, effect of, in leather, RP1109 849
*Creamer, A. S., E. N. Bunting, R. F. Geller and*, Some "soft" glazes of low thermal expansion, RP1064 57
Crease-resistant finishes for fabrics, evaluation, RP1077 241
Critical cooling rate of iron-carbon alloys and carbon steels, effect of carbon, RP1092 571
Critical solution temperatures of mixtures of gasoline with aqueous alcohol {RP1059 1 / RP1060 9
Cross-connections in plumbing systems, RP1086 479

D

Page

*Dahl, Andrew I., Wm. F. Roeser and,* Reference tables for iron-constantan and copper-constantan thermocouples, RP1080 337
*Defandorf, Francis M., Francis B. Silsbee and,* A transformer method for measuring high alternating voltages and its comparison with an absolute electrometer, RP1079 317
——, ——, *Herbert B. Brooks and,* An absolute electrometer for the measurement of high alternating voltages, RP1078 253
Density of heat-resisting alloys, RP1106 809
Dental gold alloys, analysis, RP1103 745
Deuterium oxide, electromotive force of standard cells containing RP1094 599
*Diamond, Harry, Wilbur S. Hinman, Jr., and Francis W. Dunmore,* A method for the investigation of upper-air phenomena and its application to radio meteorography, RP1082 369
*Digges, Thomas G.,* Effect of carbon on the critical cooling rate of high-purity iron-carbon alloys and plain carbon steels, RP1092 571
Dispersion equation for distilled water, RP1085 419
Distilled water, refractive index, RP1085 419
Dopes for aircraft fabrics, use of plastics, RP1098 651
*Dorsey, N. Ernest,* Supercooling and freezing of water, RP1105 799
Dühring's rule, test of, RP1097 641
*Dunmore, Francis W.,* An electric hygrometer and its application to radio meterography, RP1102 723
——, *Wilbur S. Hinman, Jr., Harry Diamond and,* A method for the investigation of upper-air phenomena and its application to radio meteorography, RP1082 369

E

*Eaton, Herbert N., Gene E. Golden, Roy B. Hunter and,* Cross-connections in plumbing systems, RP1086 479
*Eberle, Allan R., John W. McBurney and,* Strength, water absorption, and resistance to freezing and thawing of sand-lime brick, RP1065 67
Ebulliometry, water as a reference standard, RP1088 549
Electrodeposits, measurement of thickness, RP1081 357
Electrode, silver-silver chloride, RP1108 837
Electrometer, absolute, compared with a transformer method, RP1079 317
Electrometer, absolute, for measuring high alternating voltages, RP1078 253
Electromotive force of standard cells containing deuterium oxide, RP1094 599
Enamel frits, consistency, RP1063 39
Ethyl alcohol with gasolines, water tolerances, RP1059 1
Ethylene chloride, boiling point and vapor pressure, RP1097 641
Expansion, thermal, of glazes, RP1064 57
Expansion, thermal, of heat-resisting alloys, RP1106 809
Extraction apparatus, for separating a lubricating-oil fraction with acetic acid, RP1067 83

F

Fabrics, aircraft, use of plastics in dopes, RP1098 651
Fabrics, evaluation of crease-resistant finishes, RP1077 241
Fillers, in asphalt, RP1073 159
Finishes for fabrics, evaluation of crease-resistant, RP1077 241
Fire-clay ladle sleeves, thermal expansion, RP1084 411
Fire tests of wood partitions, RP1076 217
Flexometer for evaluating crease-resistant finishes of fabrics, RP1077 241
Fluorine, determination in phosphate rock, RP1095 607
Freezing and thawing of sand-lime brick, RP1065 67
Freezing of water, RP1105 799
Frequencies, critical, maximum usable {RP1096 627 / RP1100 683
Frits, enamel, consistency, RP1063 39
Fructose, mutarotation rates, RP1104 773
Furanose sugars, RP1104 773

C

Page

Galactose, mutarotation rates, RP1104 773
Gamma-, alpha-, and beta-cellulose, volumetric determination in pulps and papers, RP1068 87
Gasoline with alcohol, water tolerances {RP1059 1 / RP1060 9
*Geller, R. F., E. N. Bunting,* and *A. S. Creamer,* Some "soft" glazes of low thermal expansion, RP1064 57
*Gilchrist, Raleigh,* New procedure for the analysis of dental gold alloys, RP1103 745
*Gilliland, Theodore R., Samuel S. Kirby, Newbern Smith,* and *Stephen E. Reymer,* Maximum usable frequencies for radio sky-wave transmission, 1933 to 1937, RP1096 627
Glass in portland cement clinker, RP1066 77
Glazes, lead boro silicate, RP1064 57
Gold, precipitation by sodium nitrite, RP1103 745
*Golden, Gene E., Herbert N. Eaton, Roy B. Hunter and,* Cross-connections in plumbing systems, RP1086 479
Grain size of iron-carbon alloys and carbon steel, RP1092 571
Growth of heat-resisting alloys, RP1106 809
Guloheptoses, bromine oxidation, RP1069 97

H

Hardenability of iron-carbon alloys and carbon steels, RP1092 571
*Harris, Milton, and Arthur L. Smith,* Photochemical reactions of wool, RP1091 563
——, *Henry A. Rutherford and,* Detection of oxidation in wool, RP1089 555
——, ——, Reaction of wool with hydrogen peroxide, RP1090 559
*Harrison, William N., Robert E. Stephens, and Stephen M. Shelton,* Consistency of eight types of vitreous enamel frits at and near firing temperatures, RP1063 39
Heating of water, effect on its supercooling and freezing, RP1105 799
Heat of activation for mutarotation reactions, RP1104 773
Heat of combustion of isoprene, RP1093 599
Heats of hydration and transition of calcium sulfate, RP1107 825
Heat of solution of calcium sulfate in hydrochloric acid, RP1107 825
Heat-resisting alloys, properties, RP1106 809
Height of reflection of radio waves in the ionosphere {RP1096 627 / RP1100 683
*Heindl, Raymond A., and George J. Cooke,* Fire-clay ladle sleeves, RP1084 411
Hemihydrate, heats of hydration and transition, RP1107 825
*n*-Heptane, boiling point and vapor pressure, RP1097 641
*Hidnert, Peter,* Thermal expansion and effects of heat treatments on the growth, density, and structure of some heat-resisting alloys, RP1106 809
High alternating voltages, absolute electrometer for measuring, RP1078 253
High-voltage measurements by transformer method and by an absolute electrometer, RP1079 317
*Hinman, Wilbur S., Jr., Francis W. Dunmore, Harry Diamond and,* A method for the investigation of upper-air phenomena and its application to radio meteorography, RP1082 369
*Hoffman, James I., and G. E. F. Lundell,* Analysis of phosphate rock, RP1095 607
*Hornibrook, Floyd B., Jesse S. Rogers, George L. Pigman and,* A portable apparatus for measuring vibration in fresh concrete, RP1101 707
Humidity measurements with radio meteorograph {RP1082 369 / RP1102 723
*Humphreys, Curtis J.,* Interference measurements in the first spectra of neon, argon, and krypton between 4812 and 3319 A, RP1061 17
*Hunter, Roy B., Gene E. Golden, and Herbert N. Eaton,* Cross-connections in plumbing systems RP1086 479
Hydraulics, back-siphonage in plumbing systems, RP1086 479
Hydrocarbons, analysis and structure by near infrared absorption spectra, RP1072 129
Hydrogen peroxide, effect on wool {RP1089 555 / RP1090 559

Page

Hydrolitic precipitation of base metals, RP1103... 745
Hygrometer, use of electric-type in radio meteorography, RP1102... 723
Hygrometer, use of hair-type in radio meteorography, RP1062... 369

I

Inclusion in rubber, photoelastic determination of stresses around, RP1083... 393
Index of refraction of distilled water, RP1085... 419
Indium, determination in dental gold alloys, RP1103... 745
Infrared, absorption spectra of hydrocarbons in near, RP1072... 129
Infrared wave lengths of iron, titanium, and carbon, RP1062... 33
Ink, stamp-pad, quick-drying, RP1087... 543
*Insley, Herbert, and Howard F. McMurdie*, Minor constituents in portland cement clinker, RP1074... 173
Interference measurements in first spectra of neon, argon, and krypton, RP1061... 17
Ionosphere measurements, vertical and oblique incidence {RP1056... 627 / RP1100... 683
Iron-carbon alloys, effect of carbon on critical cooling rate, RP1092... 571
Iron-chromium-aluminum and iron-chromium-cobalt alloys, properties, RP1106... 809
Iron-constantan, copper-constantan thermocouples, reference tables, RP1080... 337
Iron salts, effect of in leather, RP1109... 33
Iron spectrum, RP1062... 33
*Isbell, Horace S.*, Bromine oxidation and mutarotation measurements with α-d-δ-mannoheptose and α-d-δ-guloheptose, RP1069... 97
—, *and William W. Pigman*, Pyranose-furanose interconversions with reference to the mutarotations of galactose, levulose, lactulose, and turanose, RP1104... 773
Isoprene, heat of combustion, RP1093... 589

J

*Jessup, Ralph S.*, Heat of combustion of isoprene, RP1093... 589

K

*Kanagy, Joseph R.*, Influence of copper and iron salts on the behavior of leather in the oxygen bomb, RP1109... 849
Kennelly-Heaviside layer measurements {RP1056... 627 / RP1100... 683
*Kiess, Carl C.*, Infrared spectra of iron, titanium, and carbon, RP1062... 33
*Kirby, Samuel S., Newbern Smith, Stephen E. Reymer, Theodore R. Gilliland, and*, Maximum usual frequencies for radio sky-wave transmission, 1933 to 1937, RP1096... 627
*Kline, Gordon M., and Cyrus G. Malmberg*, Suitability of various plastics for use in airplane dopes, RP1098... 651
Krypton spectrum, RP1061... 17

L

Lactulose, mutarotation rates, RP1104... 773
Ladle sleeves, thermal expansion, RP1084... 411
*Launer, Herbert F.*, Volumetric determination of alpha-, beta-, and gamma-cellulose in pulps and papers containing sizing, filler, and other materials, RP1068... 87
Lead, boro silicate glazes, RP1064... 57
Lead, mannoheptonates, RP1069... 97
Lead, separation from palladium and platinum, RP1103... 745
Leather, accelerated deterioration, RP1109... 849
*Lerch, William*, Approximate glass content of commercial portland cement clinker, RP1066... 77
Levulose, mutarotation rates, RP1104... 773
Light, effect on wool, {RP1089... 555 / RP1091... 563
Lubricating oil, extraction with acetic acid, RP1067... 83
*Lundell, G. E. F., James I. Hoffman and*, Analysis of phosphate rock, RP1095... 607
Lutecium monoxide, spectrum of, RP1071... 125

M

Page

*McBurney, John W., and Allan R. Eberle*, Strength, water absorption, and resistance to freezing and thawing of sand-lime brick, RP1065... 67
*McMurdie, Howard F., Herbert Insley and*, Minor constituents in portland cement clinker, RP1074... 173
Magnesia, estimation of crystalline MgO in portland cement clinker, RP1066... 77
Magnetic method for measuring thickness of nonmagnetic coatings, RP1081... 357
*Malmberg, Cyrus G., Gordon M. Kline and*, Suitability of various plastics for use in airplane dopes, RP1098... 651
Mannoheptoses, mutarotation and bromine oxidation, RP1069... 97
*Matheson, Harry, Edgar Reynolds Smith and*, Boiling points of benzene, ethylene chloride, *n*-heptane, and 2, 2, 4-trimethylpentane over the range 600- to 860-mm pressure, RP1097... 641
*Meggers, William F., William W. Watson and*, Spectrum of lutecium monoxide, RP1071... 125
Metal coatings, thickness measurements, RP1081... 357
Metals, iron-carbon alloys and carbon steels, effect of carbon on critical cooling rate, RP1092... 571
Meteorograph, radio {RP1062... 369 / RP1102... 723
Microstructure of portland cement clinker, RP1074... 173
Minimum-deviation refractometry of distilled water, RP1085... 419
Motes, effect on supercooling and freezing of water, RP1105... 799
Motor fuels, water tolerances of mixtures of gasoline with ethyl alcohol {RP1059... 1 / RP1060... 9
Mutarotation of α-d-β-mannoheptose, RP1069... 97
Mutarotation, effect of hydrogen-ion concentrations, RP1104... 773

N

Neon spectrum, RP1061... 17
*Newman, Edwin S., and Lansing S. Wells*, Heats of hydration and transition of calcium sulfate, RP1107... 825
*n*-Heptane, boiling point and vapor pressure, RP1097... 641
Nickel-plate, thickness measurements, RP1081... 357
Nonmagnetic coatings, measurement of thickness, RP1081... 357
*n*-Propyl alcohol, gasoline, and water mixtures, critical solution temperatures, RP1060... 9

O

Oil, lubricating, extraction with acetic acid, RP1067... 83
Optical rotation of α-d-β-mannoheptose, RP1069... 97
Oxidation, detection in wool, RP1089... 555

P

Palladium and platinum ammines, decomposition by sulfuric acid, RP1103... 745
Palladium, platinum, and rhodium, separation from base metals by sodium nitrite, RP1103...
Papers and pulps, volumetric determination of alpha-, beta-, and gamma-cellulose, RP1068... 87
Partitions, fire tests, RP1076... 217
Petroleum, near infrared absorption of hydrocarbons, RP1072... 129
pH changes in leather, RP1109...
Phosphate rock, analysis, RP1095... 607
Photochemical reactions in wool, RP1091... 563
Photoelastic determination of stresses around a circular inclusion in rubber, RP1083... 393
*Pigman, George L., Floyd B. Hornibrook, and Jesse S. Rogers*, A portable apparatus for measuring vibration in fresh concrete, RP1101... 707
*Pigman, William W., and Horace S. Isbell*, Pyranose-furanose interconversions with reference to the mutarotations of galactose, levulose, lactulose, and turanose, RP1104... 773
Plastics for use in aircraft dopes, RP1098... 651
Plumbing systems, back-siphonage in, RP1086... 479

Page

Portland cement clinker, glass content, RP1066.. 77
Portland cement, minor constituents, RP1074.. 173
*Priest, Irwin G., and Ferdinand G. Brickwedde,* Minimum perceptible colorimetric purity as a function of dominant wave length, RP1099... 673
Prism refractometry, distilled water, RP1085... 419
*n*-Propyl alcohol, water, and gasoline mixtures, critical solution temperatures, RP1060..... 9
Pulps and papers, volumetric determination of alpha-, beta-, and gamma-cellulose, RP1068.. 87
Purity, minimum percep ible colorimetric, RP1099..... 673
Pyrometric cone equivalent of ladle sleeves, RP1084..... 411

Q

Quick-drying stamp-pad inks, RP1087..... 543

R

Radio frequency, superconduction at, RP1070.. 109
Radio meteorograph {RP1082..... 369 / RP1102..... 723}
Radio-meteorograph investigation of upper-air phenomena, RP1082..... 369
Radiometric measurements of ultraviolet solar radiation intensities in the stratosphere, RP1075..... 185
Radio-wave transmission, re- {RP1096..... 627 / tardation in the ionosphere: RP1100..... 683}
Radio correction factor of a voltage transformer on various connections, RP1079..... 317
Reference tables for iron-constantan and copper-constantan thermocouples, RP1080..... 337
Refining of dental gold and jewelry scrap, RP1103..... 745
Refractive index of distilled water, RP1085..... 419
Resilience of fabrics, RP1077..... 241
*Reymer, Stephen, E., Samuel S. Kirby, Newbern Smith, Theodore R. Gilliland and,* Maximum usable frequencies for radio sky-wave transmission, 1933 to 1937, RP1096..... 627
*Roeser, Wm. F., and Andrew I. Dahl,* Reference tables for iron-constantan and copper-constantan thermocouples, RP1080..... 337
*Rogers, Jesse S., Floyd B. Hornibrook, George L. Pigman and,* A portable apparatus for measuring vibration in fresh concrete, RP1101..... 707
*Rose, Frank W., Jr.,* Quantitative analysis, with respect to the component structural groups, of the infrared (1 to 2 $\mu$) molar absorptive indices of 55 hydrocarbons, RP1072..... 129
Rubber, photoelastic determination of stresses around a circular inclusion, RP1083..... 393
Rubber-stamp ink, quick-drying, RP1087..... 543
*Rutherford, Henry A., and Milton Harris,* Detection of oxidation in wool, RP1089..... 555
——, ——, Reaction of wool with hydrogen peroxide, RP1090..... 559

S

Sand-lime brick, properties, RP1065..... 67
*Schicktanz, Sylvester T.,* A laboratory extraction apparatus and its use in separating a lubricating-oil fraction with acetic acid, RP1067..... 83
*Schiefer, Herbert F.,* Evaluation of crease-resistant finishes for fabrics, RP1077..... 241
*Scott, Russell B., Ferdinand G. Brickwedde, Francis B. Silsbee and,* Some experiments at radio frequencies on superconductors, RP1070.. 109
Sedimentation of water, effect on its supercooling and freezing, RP1105..... 799
Sensibility to chromaticity differences, RP1099.. 673
*Shelton, Stephen M., Robert E. Stephens, William N. Harrison and,* Consistency of eight types of vitreous enamel frits at and near firing temperatures, RP1063..... 39
Silica, determination in phosphate rock, RP1095.. 607
*Silsbee, Francis B., Ferdinand G. Brickwedde, and Russell B. Scott,* Some experiments at radio frequencies on superconductors, RP1070..... 109
——, *and Francis M. Defandorf,* A transformer method for measuring high alternating voltages and its comparison with an absolute electrometer, RP1079..... 317
——, ——, *Herbert B. Brooks and,* An absolute electrometer for the measurement of high alternating voltages, RP1078..... 253
Silver-silver chloride electrode, reproducibility, RP1108..... 837
Skip distance of radio waves {RP1096..... 627 / RP1100..... 683}
*Smith, Arthur L., Milton Harris and,* Photochemical reactions of wool, RP1091..... 559
*Smith, Edgar Reynolds, and Harry Matheson,* Boiling points of benzene, ethylene chloride, *n*-heptane, and 2, 2, 4-trimethylpentane over the range 660- to 860-mm pressure, RP1097..... 641
——, *and John Keenan Taylor,* Reproducibility of the silver-silver chloride electrode, RP1108.. 837
——, *Wojciech Świętosławski and,* Water as a reference standard for ebulliometry, RP1088.. 649
*Smith, Newbern,* Application of vertical-incidence ionosphere measurements to oblique-incidence radio transmission, RP1100..... 683
——, *Stephen E. Reymer, Samuel S. Kirby, Theodore R. Gilliland and,* Maximum usable frequencies for radio sky-wave transmission, 1933 to 1937, RP1096..... 627
Sodium nitrite, use in analysis of dental gold alloys, RP1103..... 745
Solar radiation ultraviolet meter, RP1075..... 185
Solubility of glazes, RP1064..... 87
Soluble anhydrite, heats of hydration and transition, RP1107..... 825
Soundings, comparative with radio meteorograph and aerograph, RP1082..... 369
Spectra, hydrocarbon analysis by near infrared absorption, RP1072..... 129
Spectra of iron, titanium, and carbon, RP1062.. 33
Spectra of noble gases (neon, argon, and krypton) RP1061..... 17
Spectrochemical examination of phosphate rock, RP1095..... 607
Spectrometer, use of, for refractometry of distilled water, RP1085..... 419
Spectrum of lutecium monoxide, RP1071..... 125
Spontaneous freezing of water, RP1105..... 799
*Stair, R., and W. W. Coblentz,* Radiometric measurements of ultraviolet solar intensities in the stratosphere, RP1075..... 185
Stamp-pad ink, quick-drying, RP1087..... 543
Standard cells containing deuterium oxide, electromotive force, RP1094..... 599
Standards of wave length in neon, argon, and krypton spectra, RP1061..... 17
Stannic sulfate, hydrolytic decomposition, RP1103..... 745
Steel, fire-clay ladle sleeves for use in casting, RP1084..... 411
Steels, carbon, effect of carbon on critical cooling rate, RP1092..... 571
*Stephens, Robert E., Stephen M. Shelton, William N. Harrison and,* Consistency of eight types of vitreous enamel frits at and near firing temperatures, RP1063..... 39
Stiffness of fabrics, RP1077..... 241
Stratosphere, humidity measurements {RP1082.. 369 / RP1102.. 723}
Stratosphere, radiometric measurements of ultraviolet solar intensities, RP1075..... 185
Stratosphere ultraviolet meter, RP1075..... 185
Strength of sand-lime brick, RP1065..... 67
Stresses around a circular inclusion in rubber, photoelastic determination, RP1083..... 393
*Strieter, O. G.,* Weathering tests on filled coating asphalts, RP1073..... 179
Structure of heat-resisting alloys, RP1106..... 809
Sugars, bromine oxidation and mutarotations, RP1069..... 97
Sulfonphthalein indicators, use in analysis of dental gold alloys, RP1103..... 745
Sulfur, determination in phosphate rock, RP1095..... 607
Sulfur in wool, effect of light, RP1091..... 553
Superconductivity at radio frequencies, RP1070.. 109
Supercooling of water, RP1105..... 799
*Świętosławski, Wojciech, and Edgar Reynolds Smith,* Water as a reference standard for ebulliometry, RP1088..... 649

T

Tantalum, superconduction in, at radio frequencies, RP1070..... 109
*Taylor, John Keenan, Edgar Reynolds Smith and,* Reproducibility of the silver-silver chloride electrode, RP1108..... 837

Page

*Taylor, John K., Leroy W. Tilton and,* Refractive index and dispersion of distilled water for visible radiation, at temperatures 0 to 60° C, RP1085 ... 419

Telemetering by radio {RP1082 ... 369 / RP1102 ... 723

Temperature measurements, thermoelectric, RP1080 ... 337

Temperature measurement with radio meteorograph, RP1082 ... 369

Textiles, measurement of wrinkleability, RP1077 ... 241

Thermal expansion of glazes, RP1064 ... 57

Thermal expansion of heat-resisting alloys, RP1106 ... 809

Thermal mutarotation of sugars, RP1104 ... 773

Thermocouple reference tables, RP1080 ... 337

Thermoelectric pyrometry, RP1080 ... 337

Thermometer, electrolytic, for radio meteorograph, RP1062 ... 369

Thermometers, platinum resistance, for spectrometry of liquids, RP1085 ... 419

*Thibodeau, Wilfred E., and Lawrence A. Wood,* Photoelastic determination of stresses around a circular inclusion in rubber, RP1083 ... 393

Thickness of electroplated and hot-dipped coatings, RP1081 ... 357

Thixotropy, vitreous enamel frits, RP1063 ... 39

*Tilton, Leroy W., and John K. Taylor,* Refractive index and dispersion of distilled water for visible radiation, at temperatures 0 to 60° C, RP1085 ... 419

Tin coatings, thickness measurements, RP1081 ... 357

Tin, improved procedure for hydrolytic precipitation, RP1103 ... 745

Tin, superconduction in, at radio frequencies, RP1070 ... 109

Titanium spectrum, RP1062 ... 33

Tolerances, color, RP1099 ... 673

Transformer method for measuring high alternating voltages, RP1079 ... 317

Turanose, mutarotation rates, RP1104 ...

2,2,4-Trimethylpentane, boiling point and vapor pressure, RP1097 ... 641

U

Ultraviolet solar intensities, radiometric measurements of, in stratosphere, RP1075 ... 185

V

Page

Velocity measurements in vibration, RP1101 ... 707

Vibration of concrete, RP1101 ... 707

*Vinal, George W., Langhorne H. Brickwedde and,* Electromotive force of saturated Weston standard cells containing deuterium oxide, RP1094 ... 599

Viscometer, rotating, for vitreous enamel frits, RP1063 ... 39

Vitreous enamel frits, consistency, RP1063 ... 39

Voltages, high alternating, absolute electrometer for measuring, RP1078 ... 253

Voltage transformer, compared with absolute electrometer, RP1079 ... 317

W

Water absorption and penetrability of sand-lime brick, RP1065 ... 67

Water, distilled, refractive index, RP1085 ... 419

Water, standard for ebulliometry, RP1088 ... 549

Water, supercooling and freezing, RP1105 ... 799

*Waters, C. E.,* Quick-drying, stamp-pad inks, RP1087 ... 543

Water tolerances of mixtures of gasoline with alcohol {RP1059 ... 1 / RP1060 ... 9

*Watson, William W., and William F. Meggers,* Spectrum of lutecium monoxide, RP1071 ... 125

Wave-length measurements of iron, titanium, and carbon, RP1062 ... 33

Wave-length standards in first spectra of neon, argon, and krypton, RP1061 ... 17

Wave velocity in concrete, RP1101 ... 707

Weathering tests on asphalts, RP1073 ... 159

*Wells, Lansing S., Edwin S. Newman and,* Heats of hydration and transition of calcium sulfate, RP 1107 ... 825

Weston standard cells containing deuterium oxide, electromotive force, RP1094 ... 599

*Wood, Lawrence A., Wilfred E. Thibodeau and,* Photoelastic determination of stresses around a circular inclusion in rubber, RP1083 ... 393

Wood partitions, fire tests, RP1076 ... 217

Wool, action of hydrogen peroxide, chlorine, bromine and light {RP1089 ... 555 / RP1090 ... 559

Wool, photochemical reactions, RP1091 ... 563

Wrinkleability of fabrics, measurement, RP1077 ... 241

Z

Zinc coatings, thickness measurements, RP1081 ... 357

JAN 27 1939

UNITED STATES DEPARTMENT OF COMMERCE
DANIEL C. ROPER, Secretary
NATIONAL BUREAU OF STANDARDS
Lyman J. Briggs, Director

# Journal of Research

of the

# National Bureau of Standards

Volume 20

January to June 1938

Research Papers 1059 to 1109

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1938

*Corrections to be noted in volume 20 of the Journal of Research of the National Bureau of Standards*

| Page | Line | Now reads in part | Should read |
|---|---|---|---|
| 6 and 7 | Eq 11 and 12 | $P$=95 and $P$=90 are the percentages of gasoline, and are not part the equations. | |
| 59 | 3 of text | $C_2H_5OH$ | $CH_3OH$. |
| 56 | 28 | 0.732 | 73.2. |
| 66 | 31 | 0.004 | 0.4. |
| 135 | Column 7 | $\frac{\Delta}{\alpha}$ | $\frac{\Delta}{\gamma}$ |
| Facing 181 | 4 of legend, figure 8 | etching for 2 seconds to show. | etching for 2 seconds in water to show. |
| Facing 182 | 1 of legend, figure 10 | Same field as figure 12 | Same field as figure 9. |
| Facing 183 | 1 of legend, figure 12 | Same field as figure 14 | Same field as figure 11. |
| Facing 182 | 1 of legend, figure 14 | Same field as figure 16 | Same field as figure 13. |
| Facing 183 | 1 of legend, figure 16 | Same field as figure 18 | Same field as figure 15. |
| 203 | 3 of legend, figure 7 | figure 6 | figure 5. |
| 224 | 4 of text | Delete all of sentence after word "plies". | |
| 234 | Table 4, column 12, item 8 | 12.6 | 12.9. |
| 347 | Table 2, column 3 | 23.49 | 25.49. |
| 496 | Equation 1 | $\lambda\frac{l}{d}$ | $\lambda\frac{1}{d}$ |
| 508 | Equation 24 | $\left.\begin{matrix}\frac{k-1}{k}\\ \frac{k-1}{k}\end{matrix}\right]$ = | $\left.\begin{matrix}\frac{k-1}{k}\\ \frac{k-1}{k}\end{matrix}\right]$ = |
| 508 | Equation 25 | | |
| 634 | 6 | Washington to North Platte. | Washington and North Platte. |
| 637 | 9, under IV | footnote 1 | footnote 2. |
| 637 | 12, under IV | footnote 1 | footnote 2. |
| 639 | 3, under VI | reference 1 | reference 2. |
| 649 | Equation 16 | 30 900 | 30.900. |
| 665 | Column 97 heading | IX | XI. |
| 687 | Legend figure 3 | tan $\phi_e$ | tan $\phi_1$. |
| 690 | 1 | an angle with the | an angle $\phi$ with the. |
| 703 | Legend figure 9 | lines on logarithmic transmission curve. | lines on transmission curve. |

Eng. Lib.
Direct

## RESEARCH PUBLICATIONS

of the

## NATIONAL BUREAU OF STANDARDS

1904–1919:

(*a*) *Bulletin of the Bureau of Standards.* A quarterly journal. The *Bulletin* contained all research papers until, in 1910, it was limited to scientific papers; see (*f*) for technical papers.

(*b*) Reprints [1] from (*a*). *Scientific Papers* S1 to S329.

(*c*) Volumes [2] of (*a*), cloth bound, consecutively paged and indexed. Volumes 1 to 14.

1919–1928:

(*d*) *Scientific Papers* [1] *of the Bureau of Standards* (separates continuing series (*b*), nos. S330 to S572).

(*e*) Volumes [2] of (*d*), cloth bound, consecutively paged and indexed. Volumes 15 to 22.

1910–1928:

(*f*) *Technologic Papers* [1] *of the Bureau of Standards*, T1 to T370. Prior to T203 issued only as separates.

(*g*) Volumes [2] of (*f*) cloth bound, beginning with T203, volume designated No. 16, to volume 22; consecutively paged and indexed.

1928:

(*h*) *Bureau of Standards Journal of Research* (issued under new title "*Journal of Research of the National Bureau of Standards*" beginning with the July 1934 number, volume 13, no. 1); (monthly), continuing and consolidating series (*d*) and (*f*). Subscription $3.50 per year, United States, Canada, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Newfoundland (including Labrador), Panama, and Venezuela; $4.50, elsewhere.

(*i*) Volumes [3] of (*h*), cloth bound (six monthly issues), consecutively paged and indexed.

(*j*) Separates [1] of (*h*) issued under new series title, *Research Papers.*

Circular C24 contains a list of (*a*) to (*g*), inclusive, from 1901 to June 30, 1925, accompanied by a short summary of each paper and a subject index. Two supplements continue this list, and with the Circular, give a complete list of all publications to June 30, 1936. A mimeographed insert furnished with the second supplement brings the list practically up to date. Copies of this Circular and the supplements should be found at Government depository libraries having files of the Bureau publications.

Copies of the separate or complete lists may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., as follows:

| | |
|---|---|
| Circular C24, 7th edition (covering the period 1901 to June 30, 1925) | 25 cents. |
| 1925–1931 Supplement to C24 (covering the period July 1, 1925, to Dec. 31, 1931) | 25 cents. |
| 1932–1936 Supplement to C24 (covering the period Jan. 1, 1932, to June 30, 1936) | 5 cents. |
| Complete list | 55 cents. |

[1] For prices and other information, see Circular C24 and Supplements thereto.

[2] Volumes 1 to 21, $2 each; 22, $3. Volumes 1, 2, and 8 of the Bulletin and volumes 15, 16, 19, and 20 of the Scientific Papers are out of print. Special prices for set, address Superintendent of Documents, Government Printing Office, Washington, D. C.

[3] Volumes 1 to 6, $2.75 each; 7 to 18, $3 each. For shipment to foreign countries, add 50 cents to the cost of the volume.

*Separate copies of the Research Papers listed herein may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at the prices indicated beginning on page V, or at a discount of 25 percent for 100 copies or more. Remittance should be in the form of a post-office money order, coupons (issued by the Superintendent of Documents for the specific purpose of purchasing Government publications), express money order, New York draft, or cash at sender's risk.*

# CONTENTS OF VOLUME 20


Vol. 20—January 1938—No. 1

RP Page

1059. Water tolerances of mixtures of gasoline with ethyl alcohol. Oscar C. Bridgeman and Elizabeth W. Aldrich.....[Price 5c] 1

1060. Critical solution temperatures of mixtures of gasoline, *n*-propyl alcohol, and water. Elizabeth W. Aldrich.....[Price 5c] 9

1061. Interference measurements in the first spectra of neon, argon, and krypton between 4812 and 3319 A. Curtis J. Humphreys [Price 10c] 17

1062. Infrared spectra of iron, titanium, and carbon. Carl C. Kiess [Price 5c] 33

1063. Consistency of eight types of vitreous enamel frits at and near firing temperatures. William N. Harrison, Robert E. Stephens, and Stephen M. Shelton.....[Price 10c] 39

1064. Some "soft" glazes of low thermal expansion. R. F. Geller, E. N. Bunting, and A. S. Creamer.....[Price 5c] 57

1065. Strength, water absorption, and resistance to freezing and thawing of sand-lime brick. John W. McBurney and Allan R. Eberle [Price 5c] 67

1066. Approximate glass content of commercial portland cement clinker. William Lerch.....[Price 5c] 77

1067. A laboratory extraction apparatus and its use in separating a lubricating-oil fraction with acetic acid. Sylvester T. Schicktanz [Price 5c] 83

1068. Volumetric determination of alpha-, beta-, and gamma-cellulose in pulps and in papers containing sizing, filler, and other materials. Herbert F. Launer.....[Price 5c] 87

Vol. 20—February 1938—No. 2

1069. Bromine oxidation and mutarotation measurements with $\alpha$-d-$\beta$-mannoheptose and $\alpha$-d-$\alpha$-guloheptose. Horace S. Isbell [Price 5c] 97

1070. Some experiments at radio frequencies on superconductors. Francis B. Silsbee, Ferdinand G. Brickwedde, and Russell B. Scott.....[Price 5c] 109

1071. Spectrum of lutecium monoxide. William W. Watson and William F. Meggers.....[Price 5c] 125

1072. Quantitative analysis, with respect to the component structural groups, of the infrared (1 to 2 $\mu$) molal absorptive indices of 55 hydrocarbons. Frank W. Rose, Jr.....[Price 10c] 129

1073. Weathering tests on filled coating asphalts. O. G. Strieter [Price 10c] 159

1074. Minor constituents in portland cement clinker. Herbert Insley and Howard F. McMurdie.....[Price 10c] 173

1075. Radiometric measurements of ultraviolet solar intensities in the stratosphere. R. Stair and W. W. Coblentz.....[Price 10c] 185

1076. Fire tests of treated and untreated wood partitions. Clement R. Brown.....[Price 10c] 217

1077. Evaluation of crease-resistant finishes for fabrics. Herbert F. Schiefer.....[Price 10c] 241

Vol. 20—March 1938—No. 3

RP Page

1078. An absolute electrometer for the measurement of high alternating voltages. Herbert B. Brooks, Francis M. Defandorf, and Francis B. Silsbee ..... [Price 15c] 253
1079. A transformer method for measuring high alternating voltages and its comparison with an absolute electrometer. Francis B. Silsbee and Francis M. Defandorf ..... [Price 10c] 317
1080. Reference tables for iron-constantan and copper-constantan thermocouples. William F. Roeser and Andrew I. Dahl. [Price 5c] 337
1081. Magnetic method for measuring the thickness of nonmagnetic coatings on iron and steel. Abner Brenner ..... [Price 5c] 357
1082. A method for the investigation of upper-air phenomena and its application to radio meteorography. Harry Diamond, Wilbur S. Hinman, Jr., and Francis W. Dunmore ..... [Price 10c] 369
1083. Photoelastic determination of stresses around a circular inclusion in rubber. Wilfred E. Thibodeau and Lawrence A. Wood [Price 5c] 393
1084. Fire-clay ladle sleeves. Raymond A. Heindl and George J. Cooke [Price 5c] 411

Vol. 20—April 1938—No. 4

1085. Refractive index and dispersion of distilled water for visible radiation, at temperatures 0 to 60° C. Leroy W. Tilton and John K. Taylor ..... [Price 15c] 419
1086. Cross-connections in plumbing systems. Roy B. Hunter, Gene E. Golden, and Herbert N. Eaton ..... [Price 15c] 479
1087. Quick-drying stamp-pad inks. C. E. Waters ..... [Price 5c] 543
1088. Water as a reference standard for ebulliometry. Wojciech Świętosławski and Edgar Reynolds Smith ..... [Price 5c] 549
1089. Detection of oxidation in wool. Henry A. Rutherford and Milton Harris ..... [Price 5c] 555
1090. Reaction of wool with hydrogen peroxide. Henry A. Rutherford and Milton Harris ..... [Price 5c] 559
1091. Photochemical reactions of wool. Milton Harris and Arthur L. Smith ..... [Price 5c] 563

Vol. 20—May 1938—No. 5

1092. Effect of carbon on the critical cooling rate of high-purity iron-carbon alloys and plain carbon steels. Thomas G. Digges. [Price 10c] 571
1093. Heat of combustion of isoprene. Ralph S. Jessup ..... [Price 5c] 589
1094. Electromotive force of saturated Weston standard cells containing deuterium oxide. Langhorne H. Brickwedde and George W. Vinal ..... [Price 5c] 599
1095. Analysis of phosphate rock. James I. Hoffman and G. E. F. Lundell ..... [Price 5c] 607
1096. Maximum usable frequencies for radio sky-wave transmission, 1933 to 1937. Theodore R. Gilliland, Samuel S. Kirby, Newbern Smith, and Stephen E. Reymer ..... [Price 5c] 627
1097. Boiling points of benzene, ethylene chloride, *n*-heptane, and 2,2,4-trimethylpentane over the range 660- to 860-mm pressure. Edgar Reynolds Smith and Harry Matheson ..... [Price 5c] 641

RP Page
1098. Suitability of various plastics for use in airplane dopes. Gordon M. Kline and Cyrus G. Malmberg.....[Price 10c] 651
1099. Minimum perceptible colorimetric purity as a function of dominant wave length. Irwin G. Priest and Ferdinand G. Brickwedde.....[Price 5c] 673
1100. Application of vertical-incidence ionosphere measurements to oblique-incidence radio transmission. Newbern Smith. [Price 10c] 683
1101. A portable apparatus for measuring vibration in fresh concrete. George L. Pigman, Floyd B. Hornibrook, and Jesse S. Rogers. [Price 10c] 707

Vol. 20—June 1938—No. 6

1102. An electric hygrometer and its application to radio meteorography. Francis W. Dunmore.....[Price 15c] 723
1103. New procedure for the analysis of dental gold alloys. Raleigh Gilchrist.....[Price 10c] 745
1104. Pyranose-furanose interconversions with reference to the mutarotations of galactose, levulose, lactulose, and turanose. Horace S. Isbell and William W. Pigman.....[Price 10c] 773
1105. Supercooling and freezing of water. N. Ernest Dorsey.[Price 5c] 799
1106. Thermal expansion and effects of heat treatments on the growth, density, and structure of some heat-resisting alloys. Peter Hidnert.....[Price 10c] 809
1107. Heats of hydration and transition of calcium sulfate. Edwin S. Newman and Lansing S. Wells.....[Price 5c] 825
1108. Reproducibility of the silver-silver chloride electrode. Edgar Reynolds Smith and John Keenan Taylor.....[Price 5c] 837
1109. Influence of copper and iron salts on the behavior of leather in the oxygen bomb. Joseph R. Kanagy.....[Price 5c] 849
Index to volume 20 (January 1938 to June 1938) Research Papers RP1059 to RP1109..... 859

○